Final Review Multiple Choice Problems #6

Directions: The questions or incomplete statements that follow are each followed by five suggested answers or completions. Choose the response that best answers the question or completes the statement.

1. Suppose that the regression line for a set of data, $y = mx + 3$, passes through the point (2, 7). If $\bar{x}$ and $\bar{y}$ are the sample means of the x- and y-values, respectively, then $\bar{y} =$
   (A) $\bar{x}$.
   (B) $\bar{x} - 2$.
   (C) $\bar{x} + 3$.
   (D) $2\bar{x} + 3$.
   (E) $3.5\bar{x} + 3$.
2. A study is made to determine whether more hours of academic studying leads to higher point scoring by basketball players. In surveying 50 basketball players, it is noted that the 25 who claim to study the most hours have a higher point average than the 25 who study less. Based on this study, the coach begins requiring the players to spend more time studying. Which of the following are true statements?
   I. While this study indicates a relation, it does not prove causation.
   II. There could well be a confounding variable responsible for the seeming relationship.
   III. While this is a controlled experiment, the conclusion of the coach is not justified.
   (A) I only
   (B) I and II
   (C) I and III
   (D) II and III
   (E) I, II, and III
3. The longevity of people living in a certain locality has a standard deviation of 14 years. What is the mean longevity if 30% of the people live longer than 75 years? Assume a normal distribution for life spans.
   (A) 61.00
   (B) 67.65
   (C) 74.48
   (D) 82.35
   (E) The mean cannot be computed from the information given.
4. A guidance counselor administers a vocabulary test to a random sample of high school seniors. Among 40 female students the average score is 69 with a standard deviation of 5.3, while among 48 male students the average score is 64 with a standard deviation of 5.6. What is a 90% confidence interval estimate for the difference in scores between female and male students?
   (A) 5 ± 1.16
   (B) 5 ± 1.36
   (C) 5 ± 1.92
   (D) 5 ± 2.23
   (E) 5 ± 2.46

5. Which of the following are affected by outliers?
   I. Mean
   II. Median
   III. Standard deviation
   IV. Range
   V. Interquartile range
   (A) I, III, and V
   (B) II and IV
   (C) I and V
   (D) III and IV
   (E) I, III, and IV

6. A manufacturer claims that a particular automobile model will get 50 miles per gallon on the highway. The researchers at a consumer-oriented magazine believe that this claim is high and plan a test with a sample of 30 cars. Assuming the standard deviation between individual cars is 2.3 miles per gallon, what should the researchers conclude if the sample mean is 49 miles per gallon?
   (A) There is not sufficient evidence to reject the manufacturer's claim; 49 miles per gallon is too close to the claimed 50 miles per gallon.
   (B) The manufacturer's claim should not be rejected because the *P*-value of .0087 is too small.
   (C) The manufacturer's claim should be rejected because the sample mean is less than the claimed mean.
   (D) The *P*-value of .0087 is sufficient evidence to reject the manufacturer's claim.
   (E) The *P*-value of .0087 is sufficient evidence to prove that the manufacturer's claim is false.

7. Suppose that for a certain Caribbean island in any 3-year period the probability of a major hurricane is .25, the probability of water damage is .44, and the probability of both a hurricane and water damage is .22. What is the probability of water damage given that there is a hurricane?
   (A) .47
   (B) .50
   (C) .69
   (D) .88
   (E) .91

8. An engineer wishes to determine the quantity of heat being generated by a particular electronic component. If she knows that the standard deviation is 2.4, how many of these components should she consider to be 99% sure of knowing the answer to within ± 0.6?
   (A) 27
   (B) 87
   (C) 107
   (D) 212
   (E) 425

9. Two possible wordings for a questionnaire on a proposed school budget increase are as follows:
   I. This school district has one of the highest per student expenditure rates in the state. This has resulted in low failure rates, high standardized test scores, and most students going on to good colleges and universities. Do you support the proposed school budget increase?
   II. This school district has one of the highest per student expenditure rates in the state. This has resulted in high property taxes, with many people on fixed incomes having to give up their homes because they cannot pay the school tax. Do you support the proposed school budget increase?

   One of these questions showed that 58% of the population favor the proposed school budget increase, while the other question showed that only 13% of the population support the proposed increase. Which produced which result and why?
   (A) The first showed 58% and the second 13% because of the lack of randomization as evidenced by the wording of the questions.
   (B) The first showed 13% and the second 58% because of a placebo effect due to the wording of the questions.
   (C) The first showed 58% and the second 13% because of the lack of a control group.
   (D) The first showed 13% and the second 58% because of response bias due to the wording of the questions.
   (E) The first showed 58% and the second 13% because of response bias due to the wording of the questions.

For Questions 10 and 11 consider the following: Two random samples of students are chosen, one from those taking an AP Statistics class and one from those not. The following back-to-back stemplots compare the GPAs.

AP Statistics		No AP Statistics
	1	89
97653	2	015688
98775332110	3	133344777888
1100	4	

10. Which of the following are true statements?
    I. The sample sizes are the same.
    II. The medians are the same.
    III. The means are the same.
    (A) I only
    (B) I and II
    (C) I and III
    (D) II and III
    (E) I, II, and III
11. Which of the following is true about the ranges and standard deviations?
    (A) The first set has both a greater range and a greater standard deviation.
    (B) The first set has a greater range, while the second has a greater standard deviation.
    (C) The first set has a greater standard deviation, while the second has a greater range.
    (D) The second set has both a greater range and a greater standard deviation.
    (E) The two sets have equal ranges and equal standard deviations.

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12. A random sample of 20 batteries are tested and show a mean life expectancy of 218 hours with a standard deviation of 11 hours. Determine a 90% confidence interval estimate for this mean life expectancy.
    (A) 218 ± 0.95
    (B) 218 ± 3.27
    (C) 218 ± 4.05
    (D) 218 ± 4.25
    (E) 218 ± 19.02

13. Suppose X and Y are random variables with $\mu_x = 32$, $\sigma_x = 5$, $\mu_y = 44$, and $\sigma_y = 12$. Given that X and Y are independent, what are the mean and standard deviation of the random variable $X + Y$?
    (A) $\mu_{x+y} = 76$, $\sigma_{x+y} = 8.5$
    (B) $\mu_{x+y} = 76$, $\sigma_{x+y} = 13$
    (C) $\mu_{x+y} = 76$, $\sigma_{x+y} = 17$
    (D) $\mu_{x+y} = 38$, $\sigma_{x+y} = 17$
    (E) There is insufficient information to answer this question.

14. Suppose you toss a fair die three times and it comes up an even number each time. Which of the following is a true statement?
    (A) By the law of large numbers, the next toss is more likely to be an odd number than another even number.
    (B) Based on the properties of conditional probability the next toss is more likely to be an even number given that three in a row have been even.
    (C) Dice actually do have memories, and thus the number that comes up on the next toss will be influenced by the previous tosses.
    (D) The law of large numbers tells how many tosses will be necessary before the percentages of evens and odds are again in balance.
    (E) The probability that the next toss will again be even is .5.

15. A college alumni office states that 20% of graduates eventually become lawyers, 25% doctors, and 35% corporate executives. The remaining 20% are spread out among a variety of professions. A new survey taken of 625 graduates turned up 110 lawyers, 140 doctors, 250 corporate executives, and 125 others. Is there sufficient evidence that the percentages quoted by the alumni office have changed? Test at the 5% significance level.
    (A) No, with $\chi^2 = 2.82$ there is not sufficient evidence.
    (B) No, with $\chi^2 = 5.64$ there is not sufficient evidence.
    (C) No, with $\chi^2 = 7.954$ there is not sufficient evidence.
    (D) Yes, with $\chi^2 = 2.82$ there is sufficient evidence.
    (E) Yes, with $\chi^2 = 7.954$ there is sufficient evidence.

16. Suppose you wish to compare the AP Statistics exam results for the male and female students taking AP Statistics at your high school. Which is the most appropriate technique for gathering the needed data?
    (A) Census
    (B) Sample survey
    (C) Experiment
    (D) Observational study
    (E) None of these is appropriate.

17. A local restaurant owner claims that only 15% of visiting tourists stay for more than 2 days. A chamber of commerce volunteer is sure that the real percentage is higher. He plans to survey 100 tourists and intends to speak up if at least 18 of the tourists stay longer than 2 days. What is the probability of mistakenly rejecting the restaurant owner's claim if it is true?
    (A) .0357
    (B) .0714
    (C) .1428
    (D) .2005
    (E) .4010